1    **1.** A database management system having the improvement comprising:

2         bitmap values, a bitmap value having a representation of a bitstring wherein set bits

3    specify a set of objects whose definitions are built into the database management system, and

4         user-accessible operations on the bitmap values.


1    **2.** The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3         a set-to-bitmap operation wherein a bitmap value is derived from a given set of the

4    objects.


1    **3.** The database management system set forth in claim 2 wherein:

2         the derived bitmap value is a new bitmap value that specifies the objects in the given

3    set.


1    **4.** The database management system set forth in claim 2 wherein:

2         the derived bitmap value is a preexisting bitmap value which now further specifies the

3    objects in the given set.


1    **5.** The database management system set forth in claim 2 wherein:

2         the derived bitmap value is a preexisting bitmap value which now no longer

3    specifies any objects in the given set.


1    **6.** The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3         a bitmap-to-set operation wherein the set of the objects specified in a given bitmap

4    value is derived from the given bitmap value.


1    **7.** The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3         a bitmap-to-count operation wherein the number of the objects in the set specified in a

4    given bitmap value is derived from the given bitmap value.


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1    **8.**    The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3           an existence operation wherein a value representing the logical value TRUE is returned

4    when a given object belongs to the set of the objects represented by a given bitmap value.


1    **9.**    The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3           a logical operation on a first bitstring represented by a first bitmap value and a second

4    bitstring represented by a second bitmap value.


1    **10.**    The database management system set forth in claim 1 wherein the user-accessible

2    operations comprise at least:

3           a comparison operation on a first bitmap value and a second bitmap value wherein a

4    value representing the logical value TRUE is returned when the first bitmap value and the

5    second bitmap value specify the same set of the objects.


1    **11.** The database management system set forth in claim 1 wherein:

2           the bitmap values include  settable bitmap values; and

3           the user-accessible operations comprise at least an assignment operation which sets a

4    target settable bitmap value from a source bitmap value.


1    **12.** The database management system set forth in claim 1 wherein:

2           the bitmap values include bitmap values that are persistent in the database management

3    system.


1    **13.** The database management system set forth in claim 12 wherein:

2           the persistent bitmap values include bitmap values in fields of tables of the database

3    management system.


1    **14.** The database management system set forth in claim 1 wherein:

2           the bitstring is compressed.


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1    **15.** The database management system set forth in claim 1 wherein:

2           the objects are identifiers for other objects that exist in the database management

3    system.

1    **16.** The database management system set forth in claim 15 wherein:

2           the identifiers for the other objects are  row identifiers of rows in the database

3    management system.

1    **17.** The database management system set forth in claim 16 wherein:

2           the row identifiers are row identifiers returned by a user-defined query executed in the

3    database management system.

1    **18.** The database management system set forth in claim 17 wherein:

2           the query returns a row identifier when a field in the row has an attribute specified in

3    the query,

4    whereby the bitmap value represents the set of fields having the specified attribute.

1    **19.** The database management system set forth in claim 1 wherein:

2           the objects are identifiers for other objects that exist outside the database management

3    system.

1    **20.** The database management system set forth in claim 19 wherein:

2           the identifiers for objects that exist outside the database management system are

3    electronic product codes for product items.

1    **21.** A data storage device, the data storage device being characterized in that:

2           the data storage device contains code which, when executed in a computer system,

3    implements the database management system set forth in claim 1.

1    **22.**    A bitmap value employed in a database management system, the bitmap value

2    representing a first set of first objects, the first objects being external to the database

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3   management system and members of the first set being mapped onto a members of a second set

4   of second objects that is defined in the database management system, and

5   the bitmap value comprising:

6           a mapping specifier that maps a string of bits to a subset of the second set; and

7           a representation of the string of bits wherein a bit is set in the represented string of bits

8   when the member of the second set that is mapped to the bit has a member of the first set

9   mapped thereto.


1   **23.** The bitmap value set forth in claim 22 wherein:

2           the second set is ordered.


1   **24.** The bitmap value set forth in claim 23 wherein:

2           the order of the members of the second ordered set corresponds to values of the

3   members thereof;

4           the mapping specifier specifies the mapping by specifying one or more ranges of the

5   values of the members of the second ordered set to which the string of bits is mapped; and

6           the representation of the string of bits represents strings of bits corresponding to the

7   ranges.


1   **25.** The bitmap value set forth in claim 24 wherein:

2           the mapping specifier specifies the range of the values by specifying a start value and

3   an end value.


1   **26.** The bitmap value set forth in claim 24 wherein:

2           the values include a prefix which determines a range of the values; and

3           the mapping specifier specifies the range of the values by specifying the prefix for the

4   range.


1   27. The bitmap value set forth in claim 26 wherein:

2           the mapping specifier further specifies the range of the values by using a start value and

3   an end value to specify one or more subranges of the range specified by the prefix.

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1　**28.** The bitmap value set forth in claim 24 wherein:

2　　　　the objects in the second ordered set are identifiers for objects in the first set.


1　**29.** The bitmap value set forth in claim 28 wherein:

2　　　　the identifiers for objects in the first set are electronic product codes for the objects


1　**30.** The bitmap value set forth in claim 22 wherein:

2　　　　there is a plurality of the bitmap values in the database management system; and

3　certain of the bitmap values are persistent in the database management system.


1　**31.** The bitmap values set forth in claim 30 wherein:

2　　　　the persistent bitmap values include bitmap values in fields of tables of the database

3　management system.


1　**32.** The bitmap value set forth in claim 22 wherein:

2　　　　the representation of the bitstring is a compressed representation thereof.


1　**33.** The bitmap value set forth in claim 22 wherein:

2　　　　there is a plurality of the bitmap values in the database management system; and

3　　　　the database management system provides a plurality of user-accessible operations on

4　the bitmap values.


1　**34.** The bitmap value set forth in claim 33 wherein:

2　　　　certain of the user-accessible operations alter the range specifier and the representation

3　of the  bitstring as required to map the represented string of bits to a subset of the second set

4　that is required for the operation.


1　**35.** A data storage device, the data storage device being characterized in that:

2　　　　the data storage device contains code which, when executed in a computer system,

3　implements the bitmap value set forth in claim 22.

1  **36.** A method employed in a database system of making a bitmap value that represents a first

2  set of objects external to the database system,

3  the method comprising the steps performed in the database system of:

4  mapping the objects onto a second ordered set of identifiers defined in the database

5  management system;

6  mapping a bitstring that is represented in the bitmap value onto a subset of the second

7  set that includes the identifiers onto which the objects have been mapped; and

8  setting the bits in the bitstring that correspond to the identifiers onto which the objects

9  have been mapped.

1  **37.** The method set forth in claim 36 wherein:

2  in the step of mapping the objects, the identifiers in the second set are identical with

3  identifiers that are employed externally to the database system to identify the objects.

1  **38.** The method set forth in claim 37 wherein:

2  in the second set, the identifiers are electronic product codes.

1  **39.** The method set forth in claim 36 wherein the step of mapping a bitstring comprises the

2  steps of:

3  making a range specifier that specifies a range of the ordered set of identifiers that

4  includes the identifiers into which the objects have been mapped; and

5  mapping the bits in the bitstring to the specified range.

1  **40.** The method set forth in claim 39 wherein the step of making a range specifier includes the

2  step of:

3  making a start value and an end value which together specify the range.

1  **41.** The method set forth in claim 39 wherein the step of making a range specifier includes the

2  step of

3  making a prefix value which specifies the range.

1  **42.** The method set forth in claim 36 further comprising the step of:

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2      compressing the bitstring.

1   **43.** A data storage device, the data storage device being characterized in that:

2      the data storage device contains code which, when executed in a computer system,

3   implements the method set forth in claim 36.

1   **44.** A bitmap value employed in a database management system to represent a first subset of

2   the row identifiers defined in the database management system,

3      the bitmap value comprising:

4      a mapping specifier  that maps a string of bits to a second subset of the set of row

5   identifiers; and

6      a representation of the string of bits wherein a bit is set in the represented string of bits

7   when the member of the second subset that is mapped to the bit corresponds to a member of

8   the first subset; and

9      the first subset is returned by a user-defined query executed by the database

10  management system

1   **45.** The bitmap value set forth in claim 44 wherein:

2      the database management system dynamically alters the mapping specifier and the

3   representation of the string of bits as required to map the representation of the string of bits to a

4   second subset of the row identifiers that includes the first subset of the row identifiers.

1   **46.** The bitmap value set forth in claim 44 wherein:

2      the query returns a row identifier when a field in the row identified by the row identifier

3   has an attribute specified in the query,

4   whereby the bitmap value represents the set of fields whose values have the specified attribute.

1   **47.** A data storage device, the data storage device being characterized in that:

2      the data storage device contains code which, when executed in a computer system,

3   implements the method set forth in claim 44.

1   **48.** A method of reducing the size of a list of electronic product codes,

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2    the method comprising the steps of:

3         making a bitmap value that includes a range specifier and a bitstring representation, the

4    range specifier specifying a range of the electronic product codes that includes one or more

5    electronic product codes on the list and the bitstring representation representing a bitstring that

6    is mapped onto the specified range and

7         setting a bit in the bitstring representation when the bit corresponds to an included

8    electronic product code.

1    **49.** The method set forth in claim 48 further comprising the step of:

2         compressing the bitstring representation.

1    **50.** The method set forth in claim 48 wherein:

2         the range specifier includes a prefix that is shared by the one or more electronic product

3    codes.

1    **51.** A data storage device, the data storage device being characterized in that:

2         the data storage device contains code which, when executed in a computer system,

3    implements the method set forth in claim 48.

1    **52.** A representation of a set of electronic product codes for use in a digital system that

2    transfers or processes electronic product codes,

3    the representation comprising:

4         a range specifier that specifies a range of electronic product codes that includes the

5    members of the set; and

6         a bitstring representation that represents a bitstring whose bits have been mapped onto

7    the range specified by the range specifier, a bit being set in the represented bit string when the

8    bit corresponds to a member of the set.

1    **53.** The representation of the set of electronic product codes set forth in claim 52 wherein:

2         the range specifier includes a prefix which is shared by the members of the set.

1    **54.** The representation of the set of electronic product codes set forth in claim 52 wherein:

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2          the bitstring representation is a compressed representation of the bitstring.

1     **55.** A data storage device, the data storage device being characterized in that:

2          the data storage device contains code which, when executed in a computer system,

3     implements the representation of the set of electronic product codes set forth in claim 52.

1     **56.** A method of indexing a set of objects contained in fields of an object column of a first

2     table in a database management system,  the indexing being done according to attributes that

3     apply to the objects and

4     the method comprising the steps of:

5          constructing a second table in the database management system, the second table

6     having columns including

7               an attribute specifier column whose  fields specify attributes according to

8     which the indexing is being done and

9               a bitmap column whose fields contain bitmap values including bit string

10    representations representing bit strings that are mapped onto row identifiers identifying rows of

11    the first table; and

12         for each row of the second table,

13              using the attribute specified in the row to query the first table to determine row

14    identifiers of rows of the first table whose object column fields satisfy the attribute specified in

15    the row and

16              in the row's bitmap value, setting the bits corresponding to the determined row

17    identifiers in the bitstring represented by the  bitmap value's bitstring representation.

1     **57.** A data storage device, the data storage device being characterized in that:

2          the data storage device contains code which, when executed in a computer system,

3     implements the method set forth in claim 56.